

Rhizoctonia root rot resistance of *Beta* PIs from the USDA-ARS NPGS, 2001.

Thirty Plant Introductions (PIs) from the USDA-ARS National Plant Germplasm System (NPGS) (garden beet, sugar beet, leaf beet, fodder beet, and wild beet) were evaluated for resistance to *Rhizoctonia* root rot. The trial was a randomized, complete-block design. One-row plots, replicated five times were planted at the Crops Research Lab-Fort Collins Research Farm, CO, on 25 May. Plots were 4.5 m long with 56 cm between rows and 20 to 25 cm within-row spacing. Inoculation with dry, ground, barley-grain inoculum of *Rhizoctonia solani* isolate R-9 (AG 2-2) was performed on 20 Jul. Immediately after inoculation, a cultivation was performed to throw soil into the beet crowns. The field was thinned by hand and irrigated as necessary. Beets were harvested 4 through 7 Sep. Each root was rated for rot on a scale of 0 (no damage) to 7 (dead). Analyses of variance (PROC ANOVA - SAS) were performed on disease indices (DI), percent healthy roots (undamaged classes 0 and 1 combined), and percentage of roots in classes 0 thru 3 (those most likely to be harvested and taken to the factory). Percentages were transformed using arcsin-square root to normalize the data for analyses ("AP 0-1" and "AP 0-3" in the accompanying table). Both percentages and transformations are given in the table.

We had high temperatures in the summer of 2001 and a moderate inoculum load. The *Rhizoctonia* epidemic progressed quickly, becoming severe by the beginning of September. Differences in the DI among entries were highly significant ($P < 0.001$). Mean DIs across all tests in the 2001 nursery for highly resistant FC705-1, resistant FC703, and highly susceptible FC901/C817 controls were 1.7, 2.2, and 4.4 respectively. Percentages of healthy roots were 46.5, 34.2, and 10.4% for these controls. Percentages of roots in disease classes 0 thru 3 were 85.9, 74.1, and 29.8, respectively. The highest and lowest DI for the evaluated lines was 6.9 and 1.3, respectively. The highest and lowest DI for the PI accessions was 6.88 and 3.42, respectively. One PI (IDBBNR 9554) had a DI and percent of roots rated 0 - 3 that were not significantly different from the resistant control, although the percent of healthy roots was significantly lower.

Entry	Seed Source	subspecies	Donor's ID	DI	% 0-1*	% 0-3 [†]	AP 0-1 [†]	AP 0-3 [†]
721	Ames 3096	<i>vulgaris</i>	SD IDBBNR 4828.....	4.93	0.00	22.60	0.0	25.0
722	Ames 8280	<i>vulgaris</i>	SD IDBBNR 9497.....	4.87	0.00	30.40	0.0	30.0
723	Ames 19022	<i>vulgaris</i>	SD IDBBNR 9554.....	3.42	7.60	51.40	9.9	45.9
724	Ames 19158	<i>vulgaris</i>	SD Kyzyl-ca.....	5.48	0.00	9.60	0.0	11.3
725	Ames 19160	<i>vulgaris</i>	SD Adanskaja Zeltaja.....	5.35	2.20	13.00	3.9	16.5
726	Ames 19161	<i>vulgaris</i>	SD Alasehirskaia.....	5.58	0.00	2.20	2.0	3.9
727	Ames 19162	<i>vulgaris</i>	SD Abhazskaja Zelenaja.....	5.73	1.80	13.40	3.5	14.1
728	PI 518424	<i>maritima</i>	SD IDBBNR 5918.....	5.09	0.00	15.40	0.0	18.3
729	PI 540584	<i>maritima</i>	SD WB 838.....	5.28	0.00	16.40	0.0	20.1
730	PI 540585	<i>maritima</i>	SD WB 839.....	5.56	4.40	17.20	5.6	19.1
731	PI 540613	<i>maritima</i>	SD WB 867.....	4.52	1.40	33.80	3.1	35.2
732	PI 540616	<i>maritima</i>	SD WB 870.....	6.88	0.00	1.60	0.0	3.3
733	PI 540617	<i>maritima</i>	SD WB 871.....	5.08	2.20	22.80	3.9	27.3
734	PI 540618	<i>maritima</i>	SD WB872.....	6.38	0.00	4.40	0.0	5.6
735	PI 540619	<i>maritima</i>	SD WB 873.....	6.03	0.00	6.80	0.0	11.7
736	PI 540625	<i>maritima</i>	SD WB 879.....	5.15	0.00	20.20	0.0	23.9
737	PI 540629	<i>maritima</i>	SD WB 883.....	4.76	1.60	28.40	3.3	28.1
738	PI 540630	<i>maritima</i>	SD WB 884.....	5.94	0.00	4.60	0.0	7.8
739	PI 540631	<i>maritima</i>	SD WB 885.....	5.65	0.00	10.80	0.0	11.9
740	PI 540638	<i>maritima</i>	SD WB 892.....	4.27	3.80	42.60	7.2	40.4
741	PI 540642	<i>maritima</i>	SD WB 896.....	5.57	0.00	8.40	0.0	13.2
742	PI 540643	<i>maritima</i>	SD WB 897.....	5.79	0.00	14.60	0.0	14.8
743	PI 540645	<i>maritima</i>	SD WB 899.....	5.42	0.00	21.20	0.0	23.8
744	PI 540647	<i>maritima</i>	SD WB 901.....	5.57	0.00	7.60	0.0	12.1
745	PI 540649	<i>maritima</i>	SD WB 903.....	5.88	0.00	11.40	0.0	15.3
746	PI 540651	<i>maritima</i>	SD WB 905.....	4.96	2.00	29.40	3.7	26.7
747	PI 540653	<i>maritima</i>	SD WB 907.....	6.23	0.00	8.80	0.0	11.1
748	PI 540654	<i>maritima</i>	SD WB 908.....	5.41	0.00	18.60	0.0	22.4
749	PI 540656	<i>maritima</i>	SD WB 910.....	4.63	0.00	27.80	0.0	28.9
750	PI 540657	<i>maritima</i>	SD WB 911.....	5.65	0.00	14.20	0.0	16.0
751	941025	<i>vulgaris</i>	Susceptible Check - FC901/C817.....	4.73	0.00	20.20	0.0	25.7

Entry	Seed Source	subspecies	Donor's ID	DI	% 0-1*	% 0-3 [†]	AP 0-1 [†]	AP 0-3 [†]
752	831083	<i>vulgaris</i>	FC705/1 - 'Highly Resistant Check.....	2.16	23.00	94.00	25.7	83.4
753	751080H	<i>vulgaris</i>	FC703 - 'Resistant Check.....	2.61	23.60	71.20	28.6	57.9
			LSD $P=0.05$	1.0			7.4	19.6
			Trial Mean.....	5.17	2.23	21.67	3.0	22.8

* DI = Disease Index on a scale of 0 (no damage) to 7 (plant death), % 0-1= percent healthy roots, % 0-3 those roots most likely to be harvested and taken to the factory. AP is the arcsin-square root transformation of percentages to normalize the data for analyses.